

R. R. REED.
ELECTRIC FURNACE.
APPLICATION FILED MAR. 27, 1920.

1,357,901.

Patented Nov. 2, 1920.

FIG. 1.

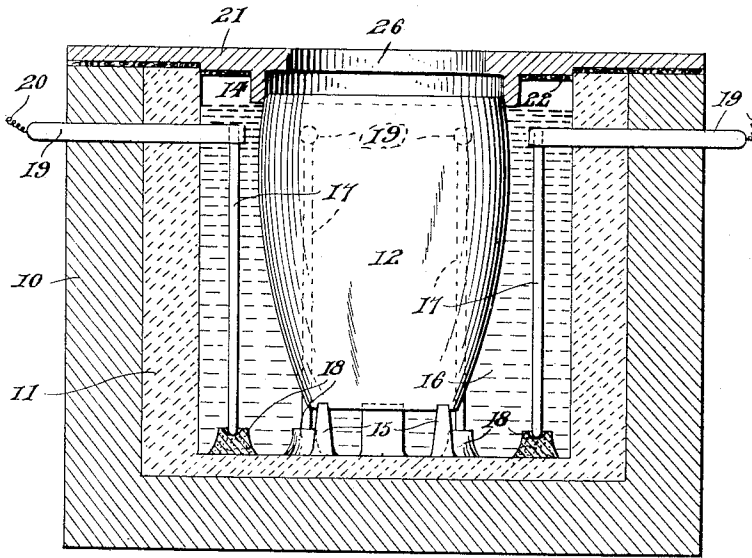


FIG. 3.

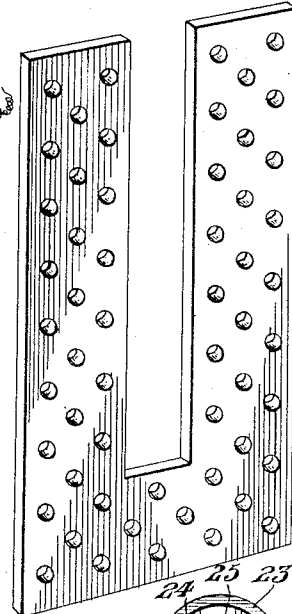


FIG. 2.

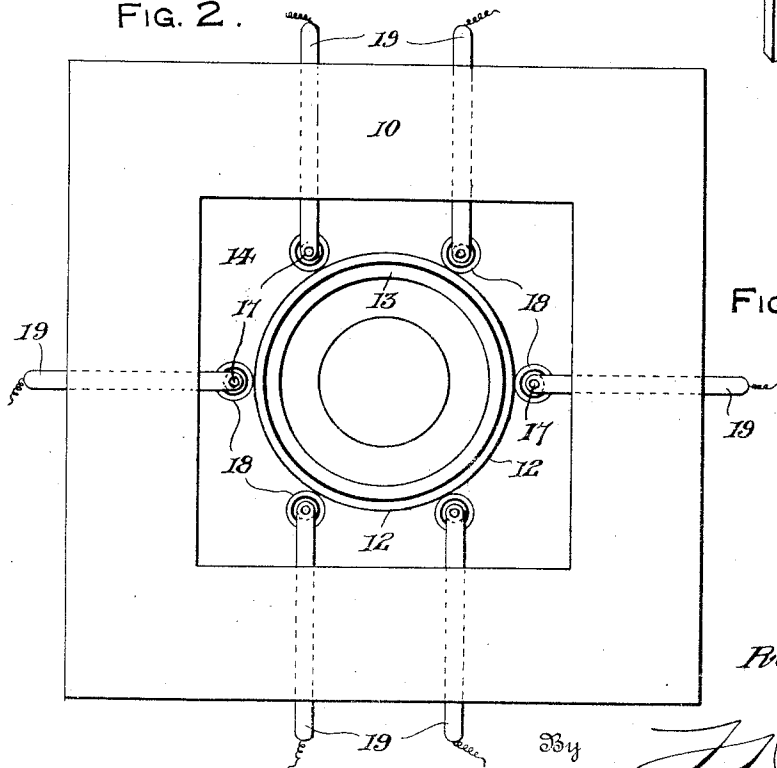


FIG. 4.

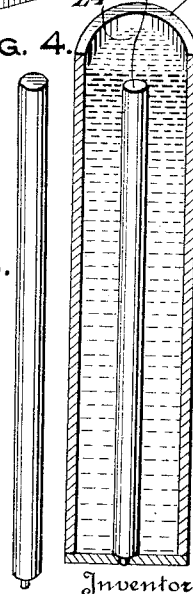


FIG. 5.

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ELECTRIC FURNACE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ROBERT R. REED, a citizen of the United States of America, residing at Ithaca, in the county of Tompkins and State of New York, have invented certain new and useful Improvements in Electric Furnaces, of which the following is a specification.

The primary object of the invention is the provision of means for protecting the resistors of an electric furnace from oxidation, convection and deterioration, the method employed being one readily practised and easily as well as inexpensively installed.

A further object of the invention is to increase the life of an electric furnace substantially indefinitely by the preservation of carbon or other resistors employed in the furnace, a protective envelop being employed failing to give up oxygen to the carbon and also cutting off convection.

A still further object of the invention is to provide a carbon resistance furnace preventing disintegration of the resistors due to oxidizing and the effect of air currents traveling along the face of the resistor disintegrating particles thereof, the invention providing yielding heat-insulation for the resistors as well as mounting the latter yieldingly in the furnace.

With these general objects in view and others that will appear as the nature of the invention is better understood, the same consists of the method hereinafter set forth which will be described in connection with one manner of carrying out the same as illustrated in the accompanying drawing.

In the drawing like reference characters designate corresponding parts throughout the several views, and

Figure 1 is a vertical transverse sectional view of the invention,

Fig. 2 is a top plan view thereof with the top plate removed, and

Figs. 3, 4, and 5 are detail views of different forms of resistors adaptable for employment with my furnace in carrying out the invention.

My method and apparatus broadly consists in the protection of resistors in electric furnaces by means of liquid glass and I have herein illustrated an electric furnace comprising an outer container 10 constructed of such material as fire brick or concrete and being a heat insulator for the mechanical

protection of the heating chamber therein. A lining 11 for the container 10 consists of magnesia (Mg.) or powdered brick dust and magnesia, thereby forming a heat insulating liner for the container. A crucible preferably formed of graphite of suitable dimensions with an open mouth 13 is centrally mounted within the heating chamber 14 upon blocks or abutments 15 in such a manner as to allow for expansion and contraction. Molten glass 16 surrounds the crucible 12 within the chamber 14 and the magnesia lining 11 contacting the glass 16 forms a cushion or resilient heat insulator therefor. The glass 16 is first inserted in the chamber 14 in powdered form, a plurality of resistors 17 being mounted in the chamber 14 with their lower ends resting upon small pedestals 18 of socket form permitting slight lateral movement to the resistors during the expansion and contraction of the glass 16.

The resistors 17 are preferably carbon, owing to the high resistance, which decreases as the temperature rises, leading in electrodes 19 being connected to the upper ends of the resistors 17 and projecting outwardly of the furnace through the lining 11 and container 10 for connection with the electrical service wires 20 leading from the generator, not shown. Any desired number of resistors 17 may be employed, it being understood that the powdered glass 16 is heated by the electrical current flowing through the resistors 17, melting the glass 16 which flows around the resistors 17 and crucible 12 shutting off all air and oxygen. The glass 16 forms none of the chemical combination with the material of either the resistors 17 or crucible 12 and the glass will not appreciably part with its oxygen content at any temperature less than 1800° C.

The glass 16 to be employed in my method and apparatus has a high SiO_2 content, such as glass having over eighty per cent. of SiO_2 in its make-up with the remainder chemically substantially equally resistant in de-oxygenation. Such glass as Pyrex (Corning Glass Company) or any glass having a high silicon oxid content may be employed. The crucible 12 is of any standard make such as Dixon & Co.'s #35 crucible. On the mechanical side, the low coefficient of expansion (.0000063) prevents destructive pressure between the crucible 12 and the electrodes 17—19 and the surrounding walls 11—10, 110

the heat insulation 11 being of a yielding nature as well as the shiftable mounting of the resistors 17 and the crucible 12 also guard against such pressures of expansion and contraction efforts.

A cap or plate 21 covers the chamber 14 being formed of such material as concrete, soapstone or other refractory material with a heat insulating lining 22 of such material as magnesia. Different forms of resistors 17 may be employed such as perforated plate resistors shown in Fig. 3 and cylindrical as shown in Fig. 5. The resistor in Fig. 5 comprises a refractory tube 23 containing molten glass 24 and a central resistor 25, the same being used in special cases where the glass bath 16 for all resistors 17 in common appears to be unsatisfactory. Whichever form of resistors is employed, the same are preferably spaced equal distances apart around the crucible 12 within the molten glass 16. An opening 26 is provided in the cap 21 for gaining access to the crucible mouth 13 therebeneath, the construction of container being substantially that usually employed in electric furnaces. Suitable arrangement may be made for withdrawing the electrodes 19 so that the glass 16 after the first heat run forms a solid envelop for cooling which contains the resistors 17 which can be replaced in the same form and is serviceable as a repair element.

My invention including the method of employing liquid glass for the protection of electric furnace resistors is not limited to the construction of apparatus herein illustrated and while an embodiment thereof has been described, it will be understood that the scope of the invention will be found in the appended claims.

What I claim as new is:

1. The method of protecting electric furnace elements comprising the employment of liquid glass.
2. The method of protecting electric furnace elements consisting in immersing the elements in liquid glass.
3. The method of protecting resistors of electric furnaces consisting in surrounding the resistors with liquid glass.
4. The method of protecting resistors of electric furnaces from disintegration consisting in surrounding the resistors with liquid glass.
5. The method of protecting electric furnace elements from disintegration consisting in surrounding such elements with pulverized glass whereby a rise in temperature of the resistors produces a molten glass envelop therefor.
6. A method for protecting the resistors of an electric furnace consisting in surrounding the resistors with powdered glass in the heating chamber of the furnace and raising the temperature of the resistors

above the melting point of the glass forming a molten glass envelop surrounding the resistors.

7. A method for protecting the resistors of an electric furnace consisting in surrounding the resistors with powdered glass in the heating chamber of the furnace and raising the temperature of the resistors above the melting point of the glass forming a molten glass envelop surrounding the resistors, and yieldingly mounting the resistors within the chamber to compensate for expansion and contraction.

8. A method of protecting the resistors of an electric furnace from oxidation, convection and disintegration consisting in surrounding the resistors with molten glass during the operation of the furnace.

9. A method of protecting the resistors of an electric furnace from oxidation, convection and disintegration consisting in surrounding the resistors with molten glass during the operation of the furnace, the crucible being within the molten glass centrally of the resistors, the resistors and crucible being yieldingly mounted for compensating for the expansion and contraction of the glass.

10. The method of protecting the resistors of an electric furnace consisting in the provision of a resilient heat insulating lining for the heating chamber of the furnace and providing molten glass surrounding the resistors in contact with said lining whereby expansion and contraction is equalized.

11. The method of protecting the crucible and resistors of electric furnaces consisting in providing a resilient heat insulating lining for the chamber of the furnace with the crucible and resistors positioned therein and the provision of molten glass surrounding the crucible and resistors within and in contact with said lining.

12. The method of protecting resistors for electric furnaces consisting in the provision of a resilient lining of magnesia for the heating chamber of the furnace and providing molten glass contacting said lining surrounding the resistors and crucible.

13. The method of protecting resistors for electric furnaces consisting in the provision of a resilient lining of magnesia for the heating chamber of the furnace and providing molten glass contacting said lining surrounding the resistors and crucible and yieldingly mounting the crucible and resistors within the molten glass of the heating chamber.

14. An electric furnace comprising a container, a resilient heat, insulating lining therefor providing a heating chamber within the furnace, electrically connected resistors within the heating chamber and molten glass within said chamber surrounding said resistors.

15. An electric furnace comprising a container, a resilient heat insulating lining therefor providing a heating chamber within the furnace, electrically connected resistors within the heating chamber and molten glass within said chamber surrounding said resistors, pedestals upon the bottom of the chamber adapted for shiftably mounting the resistors thereon for compensating for expansion and contraction.

16. An electric furnace comprising a container of refractory material, a resilient heat insulating lining therefor formed of brick dust and magnesia, electrically connected resistors inwardly of the lining, powdered glass surrounding the resistors adapted for assuming a molten mass upon raising the temperature of the resistors in the furnace.

In testimony whereof I affix my signature.

ROBERT R. REED.